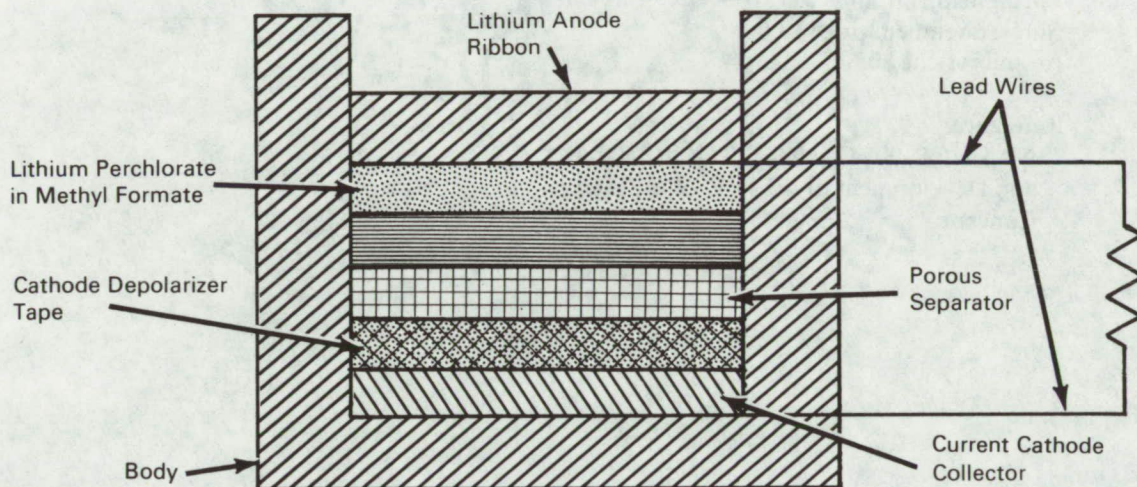


NASA TECH BRIEF



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High Energy Density Electrochemical Cell



A primary electrochemical cell which produces a very high energy density (approximately 213 watt hrs/lb) and also has the potential to achieve a high current density has been investigated experimentally. The cell has an anode of lithium, a cathode containing dihaloisocyanuric acid and a nonaqueous electrolyte comprised of a solution of lithium perchlorate in methyl formate.

Electrochemical cells having lithium anodes and copper fluoride cathodes can achieve experimental energy densities of the order of 200 watt hrs/lb and a battery has been constructed with this combination that produces up to 130 watt hrs/lb (described in Tech Brief 69-10131). An advantage of the cell is that the cathode system containing dihaloisocyanuric acid is easier to handle and much lower in cost than copper fluoride.

Lithium is of great interest as a material for anode systems of primary cells because of its inherently high

electrical potential and its high ampere-hour capacity per unit weight or volume. However, the use of lithium as an anode material imposes severe restrictions on the selection of materials used in the other essential components of the cell. For example, primary cells employing lithium anodes generally do not utilize aqueous electrolyte systems. The inherently high reactivity of lithium requires the use of nonaqueous electrolytes. Considerable care must also be taken in the selection of materials for the cathode system. Such problems inherent in the use of lithium in anode systems of primary cells have made development of these cells very difficult.

The figure shows a cut-away section of an arrangement of elements for this new cell. The recessed body is fabricated of a nonconductive material such as polypropylene. A copper trim plate is placed in the bottom of the body recess and connected to an external lead wire. A platinum cathode current collector

(continued overleaf)

is placed in contact with the copper plate. A tape carrying the cathode depolarizer is fabricated from dichloroisocyanuric acid, acetylene black and carbon fibers. The tape is placed on top of and in contact with the cathode current collector. A porous polypropylene separator is placed on the tape. A solution of lithium perchlorate in methyl formate is distributed over the top of the separator. A lithium anode ribbon is placed on the electrolyte-impregnated separator and a lead wire connected to it.

Notes:

1. The following documentation may be obtained from:

Clearinghouse for Federal Scientific
and Technical Information
Springfield, Virginia 22151
Single document price \$3.00
(or microfiche \$0.65)

Reference:

NASA-CR-90547 (N68-11794), Research
and Development of the Dry Tape Battery
Concept

2. Technical questions may be directed to:
Technology Utilization Officer
Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135
Reference: B70-10151

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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